Claims

1. A capacitive sensor having an amplifier (1) for detecting the filling level of a medium (35) in a container (30) with a non-metallic wall (31), characterized by

a first electrode (11) that is connected to the input (3) of the amplifier (1) and that is loaded with a first capacitance (21) vis-à-vis the ground (50), so that the input (3) of the amplifier (1) is capacitively loaded, whereby the electrode (11) is arranged in such a way that the electric field (41) generated by the signal (2) between the electrode (11) and the ground (50) runs essentially through the container (30) and through the medium (35) so that the magnitude of the first capacitance, on the one hand, increases as the filling level of the medium (35) in the container (30) rises and, on the other hand, is influenced by the capacitive properties of the container (30),

by a second electrode (12) that is connected to the output (4) of the amplifier (1) and

by a third electrode (13) that is connected to the input (3) of the amplifier (1), whereby the second electrode (12) and the third electrode (13) are at a distance from each other and are positioned in such a way that a second capacitance (22) exists between them whose magnitude is largely influenced by the capacitive properties of the container (30) and only negligibly influenced by the filling level of the medium (35) in the container (30), said capacitance constituting a capacitive feedback of the amplifier (1),

and also comprising a capacitor (24a) that has a third capacitance (24), whose magnitude is essentially influenced neither by the capacitive properties of the container (30) nor by the filling level of the medium (35) in the container (30), whereby one electrode (14) of the capacitor (24a) is connected to the output (4) while the other electrode (15) of the capacitor

(24a) is connected to the input (3) of the amplifier (1), so that the capacitor (24a), parallel to the second capacitance (22), likewise constitutes a capacitive feedback of the amplifier (1),

whereby the capacitance (24) of the capacitor (24a) is selected in such a way that the amplifier (1), owing to the capacitive feedback, only oscillates when the filling level of the medium (35) in the container (30) and thus the first capacitance (21) each lie below a certain threshold, whereby the second capacitance (22) counters the capacitive influence of the container (30) that loads the input (3) of the amplifier (1), so that the capacitive influence exerted by the container (30) is reduced.

2. The sensor according to claim 1, characterized in that the first electrode (11) and the third electrode (13) coincide, thus forming a first combined electrode (11a).

3. The sensor according to claim 1, characterized in that the first electrode (11) and the electrode (15) of the capacitor (24a) on the input side of the amplifier coincide and thus form a combined electrode.

4. The sensor according to claim 1, characterized in that the first electrode (11), the third electrode (13) and the electrode (15) of the capacitor (24a) on the input side of the amplifier all coincide and thus form a second combined electrode (11b).

5. The sensor according to claim 1, characterized in that the second electrode (12) and the electrode (14) of the capacitor (24a) on the input side of the amplifier coincide and thus form a third combined electrode (12b).

6. The sensor according to claims 4 and 5, characterized in that the first combined electrode (11b) and the second combined electrode (12b) are rigidly connected to each other.

7. The sensor according to claims 4 and 5, characterized in that the second combined electrode (11b) and the third combined electrode (12b) are arranged concentrically.

8. The sensor according to claim 5, characterized in that the third combined electrode (12b) has a first plate (60) and a cutout second plate (62), which is connected to the first plate (60) by means of a conductor (61) and which is arranged at a distance from the first plate (60) and concentrically to it, whereby the first combined electrode (11b) lies in a plane with the cutout second plate (62) and is arranged inside said cutout.

9. The sensor according to claim 8, characterized in that the first plate (60) is attached to one side of a printed circuit board and the cutout second plate (62) and the second combined electrode (11b) are attached to the other side of the printed circuit board.

10. The sensor according to claim 1, characterized in that the sensor is part of a circuit that supplies a switching signal when the amplifier (1) is not oscillating.

11. The sensor according to claim 1, characterized in that the dimensioning of the amplifier (1) causes it to have a high operating frequency, whereby, due to the high operating frequency range, the capacitive reactive resistance of the coupling of the electrodes (11, 12, 13) to the medium (35) is reduced to such an extent that thin adhering layers or foams of the medium (35) with their low conductivity can be clearly distinguished from the compact medium with its higher conductivity, whereby if the filling level of the medium is below a certain threshold, while adhering medium or foam is present above the surface of the medium or above the filling level of the medium, the load of the input (3) of the amplifier (1) is influenced by the

ohmic and capacitive resistance between the electrode (11) and the ground (50) in such a way that the amplifier (1) oscillates.

12. The sensor according to one of claims 1 to 11, characterized in that one electrode of the sensor consists of a plurality of electrodes connected to each other.

13. The sensor according to one of claims 1 to 12, characterized in that at least one electrode is arranged inside the container (30) and it is immersed into the medium (35) when a certain filling level is exceeded.

14. The sensor according to one of claims 1 to 13, characterized in that the sensor is arranged inside the container (30) and it is immersed into the medium (35) when a certain filling level is exceeded.

15. A capacitive sensor for the filling level of a medium (35) in a container (30) with a non-metallic wall (31), comprising an amplifier (1) having an amplification factor that is greater than 1, also comprising a first electrode (11) that is connected to the input (3) of the amplifier (1) and that is loaded with a first capacitance (21) vis-à-vis the ground (50), so that the input (3) of the amplifier (1) is capacitively loaded, which brings about a decrease of a signal (2) that is present at the input (3) of the amplifier (1), whereby the electrode (11) is arranged in such a way that the electric field (41) generated by the signal (2) between the electrode (11) and the ground (50) travels essentially through the container (30) and through the medium (35) so that the magnitude of the first capacitance increases as the filling level of the medium (35) in the container (30) rises, also comprising a second electrode (12) that is connected to the output (4) of the amplifier (1) and comprising a third electrode (13) that is connected to the input (3) of the amplifier (1), whereby the electrodes (12) and (13) are at a distance from each other and are positioned in such a way that a second capacitance

(22) exists between them whose magnitude is largely influenced by the capacitive properties of the container (30) and only negligibly influenced by the filling level of the medium (35) in the container (30), said capacitance bringing about a capacitive feedback of the amplifier (1), which brings about an increase of a signal (2) present at the input (3) of the amplifier (1), and also comprising a capacitor (24a) that has a third capacitance (24), whose magnitude is essentially influenced neither by the capacitive properties of the container (30) nor by the filling level of the medium (35) in the container (30), whereby one electrode (14) of the capacitor (24a about 4 MHz to about 10 MHz) is connected to the output (4) while the other electrode (15) of the capacitor (24a) is connected to the input (3) of the amplifier (1), so that the capacitor (24a), parallel to the second capacitance (22), likewise brings about a capacitive feedback of the amplifier (1), which brings about a further increase of the signal (2) that is present at the input (3) of the amplifier (1), whereby the capacitance (24) of the capacitor (24a) is selected in such a way that the amplifier (1), owing to the capacitive feedback, only oscillates when the filling level of the medium (35) in the container (30) and thus the first capacitance (21) each lie below a certain threshold, whereby the amplifier employed is an amplifier (1) having such an intrinsic frequency that the load of the input (3) of the amplifier (1) is influenced by the ohmic and capacitive resistance between the electrode (11) and the ground (50) in such a manner that the amplifier (1) oscillates when the filling level of the medium (35) in the container (30) is below this threshold and the inside of the wall (31) of the container (30) above the surface (36) of the medium (35) is wetted with a layer (37) of the medium (35) or when foam is present above the surface (36) of the medium (35), whereby the second capacitance (22) is selected in such a way that the decrease of the signal (2) due to the capacitive load of the input (3) of the amplifier (1) is countered only by the capacitive properties of the container (30) as a result of the increase of the signal (2) that is caused by the capacitive feedback only by the second capacitance (22), whereby the first

electrode (11), the third electrode (13) and the electrode (15) of the capacitor (24a) on the input side of the amplifier all coincide and form a disk-shaped combined electrode (11b) that is configured as a track conductor on a first side of a printed circuit board, and whereby the second electrode (12) and the electrode (14) of the capacitor (24a) coincide and form a combined electrode (12b) that is rigidly connected to the combined electrode (11b) and that has a disk-shaped first plate (60) that is configured as a track conductor on the other side of the printed circuit board, as well as a ring-shaped cutout second plate (62) that lies in a plane with the combined electrode (11b) and surrounds it concentrically and that is configured as a conductor track on the first side of the printed circuit board and that is arranged concentrically to the first plate (60), and also comprising a circuit that supplies a switching signal when the amplifier (1) is not oscillating.